Project Albert Overview

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Project Albert: Question Based

- When and how should C_2 be centralized or decentralized?

- What is the appropriate force mix required for operations in a littoral environment?

- What are the relative merits of firepower, mobility, situational awareness, stealth, and information operations in a reconnaissance/ counter reconnaissance situation?

To Answer our Questions
We Must be Able to Quantify
Three Phenomena

- Non-linearity
- Intangibles
- Co-evolving Landscapes

Our Approach…

■ Uses series of new models/analytic tools, multi-disciplinary teams, and the scientific method to explore questions

■ Exploits advances in computing power and visualization tools

■ Utilizes meta-technique of *Data Farming* to look at questions from the perspective of many data points

■ Allows us to try to understand the richness of the whole through the process of *Operational Synthesis*

The Tools Available:

---Wargames
---Equations
---Simulations
---Distillations*

* *where we have focused our attention since the inception of Project Albert*

Wargames
BOGSATS (often computer assisted)

Pro:

-Provides a common tableau for discussion
-Enhances mutual understanding
-Allows the imagination to roam

Con:

-Non-reproducible
-Often dominated by personalities
-Limited options
-Unrealistic opposition

Equations
e.g. Deterministic Models

Pro:

-Only one "run" needed
-Appeals to our background
-Ideal when steady state solutions apply

Con:

-Validation almost impossible without a theory o
-Sensitivity to initial conditions a problem
-Relations may not be functions of usual variab
-Binary events a problem
-Closed form solutions rare

Simulations
Employing surrogates which interact
and evolve over time

Pro:

-May be only way to get a high fidelity sampl

-Sample validity difficult but doable

-Experimental data may contribute

Con:

-Epimorphism onto space of outcomes proble

-Validation of ensembles beyond current stat

-Important variables may not be accessible

-Binary events are a major challenge

Distillations

Time evolution of objects which follow well defined rules

Pro:

-Validation often trivial (=verification)

-Can handle non-linearities, binary events, sensitivity to initial conditions, emergence

-Fun

-Accessible to all

-Adaptable to massively parallel machines

-Can create all the data need

-Can relate to intangibles and coevolving landscapes

Con:

-Accreditation is a ridiculous issue

-Sampling possible but may require new

Iconoclastic Bottom Line

It is difficult to construct an important question which individual techniques can address

"Theorem"

$$\cap \text{ Cons } = \varnothing$$

$$\cup \text{ Pros } =$$

$$U \implies \text{Hope}$$

(Corollary.............................)

Project Albert Players

Oversight
Technical Review Panel

Primary Players
MHPCC
LANL
COTS/CASA
SAIC
MITRE

Others
Coast Guard Academy
George Mason University
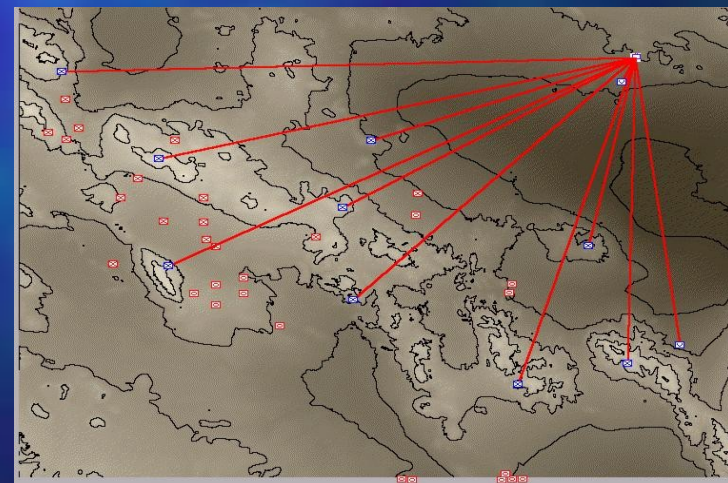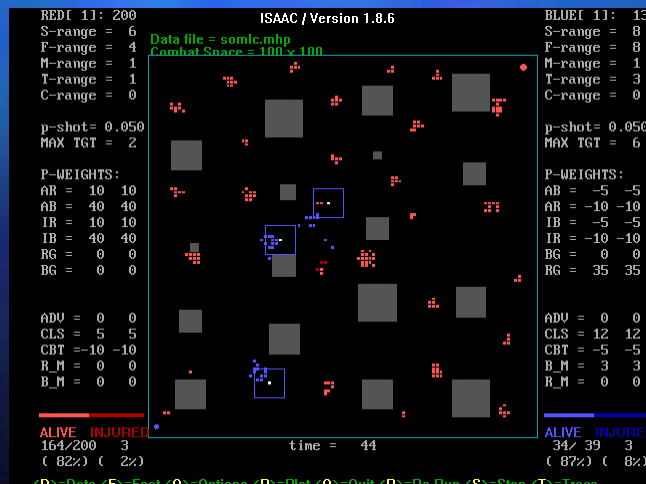Naval Postgraduate School
Sante Fe Institute
International

The Elements of Project Albert

- MODEL/SIMULATION DEVELOPMENT
- TOOLS AND CONCEPTS
- PROBLEM SPECIFICATION/TEST CASES

What We've Already Accomplished:

- ## MODEL DEVELOPMENT:
  - ISAAC (a toy model... "dot warfare")
  - Swarrior (Model Based on Hunter Warrior AWE)

What We've Already Accomplished:

- TOOLS AND CONCEPTS:
  - "Data Farming"... a 'smart' way to generate data from models... so that you're more likely to be able to answer the question of interest
    - Exploitation of Supercomputing Power
    - Already 'tapped in' to MHPCC assets

What We're Working On Now:

- **MODEL DEVELOPMENT:**
  - JIVES (model of urban combat)
    - Los Alamos National Lab
  - ARCHIMEDES (tailorable model)
    - a multi-resolution, agent-based platform which will be used to tailor "distillations" to specific problems... without having to create a new model from scratch each time
    - COTS/CASA

What We're Working On Now:

- **TOOLS AND CONCEPTS:**
  - Generative Analysis
    - a modeling concept and platform which will allow fast and autonomous explorations of the space of possibilities to determine where existing doctrine, tactics, equipment, structure, etc perform WELL or NOT SO WELL
    - a way to generate and assess future concepts …
  - Data Visualization and Processing
    - automating data farming
    - how to glean insight visually from model runs
    - how to display that information in terms of what an Operator or Decision Maker needs to see
  - "Gilgamesh"
    - Utilizing unused processing power of PCs/ Dedicated NT nodes

What We're Working On Now:

- **PROBLEM SPECIFICATION (TEST CASES):**
  - In conjunction with Cross-Service and International Collaboration
    - Evaluation of decentralized vs. centralized C2 in a given context (Naval Postgraduate School)
    - Adequate Force Mix in a Littoral Environment (Australia)
    - Relative Merits of stealth and speed vs firepower and accuracy in a recon environment (New Zealand)
    - Modeling of information operations: when is more information better? (U.S. Military Academy)
    - Modeling of various historical studies (U.S. Naval Academy)
    - Providing timely support for decision makers (Sweden)

Two Types of Project Albert "Products"

Decision Support for HQMC/MCCDC/SYSCOM
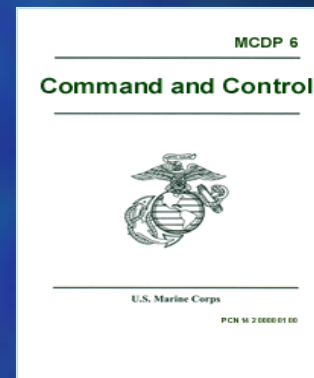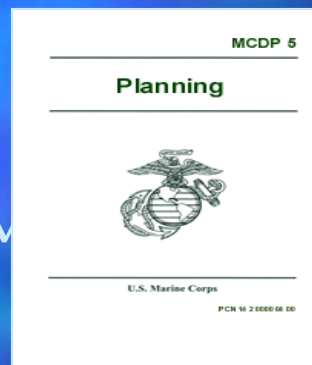
Decision Support for the Field Commander

TDG #97-8